A numerical method for the study of subwavelength apertures in metallic films.

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Plasmonic is one of the promising avenues for a technological breakthrough in nanophotonics [1]. Indeed, the peculiar properties of surface plasmons allow to control the propagation of light at subwavelength scales. New miniaturized photonic circuits could be envisaged for applications such as biophotonics or light sources.

The modeling in the domain of plasmonic leads to specific problems linked to the rapid spatial variations of the field at the vicinity of the interfaces. We report here the results obtained by applying the Method of Auxiliary Sources [2] that doesn't suffer from this variation thanks to the surface description of the problem.

The method will be applied to the case of subwavelength aperture in metallic films. By using the Green's function of a uniform metallic slab, we are able to solve the problem just by imposing boundary conditions on the aperture walls. Problems such as control of the emission will be considered to illustrate the method.

Periodic boundaries conditions will also be envisaged for the modeling of bi-periodic metallic arrays such as those involved in the so called extraordinary transmission [3].

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